PIECEWISE CORRECTION OF ERRORS OVER TEMPERATURE WITHOUT USING ON-CHIP TEMPERATURE SENSOR/COMPARATORS

BACKGROUND

[0001] In many applications, voltage and/or current output varies (i.e., drifts) based on temperature. For example, a voltage reference may generate a larger output voltage at higher temperatures than at lower temperatures or vice versa. Similarly, a current reference may generate a larger output current at higher temperatures than at lower temperatures or vice versa. Since it is desirable in many of these applications to produce a constant output signal and/or a signal that does not drift based on temperature changes, signal corrections may be applied. These temperature dependent signal corrections for output drift are important for the operation of many precision applications such as references, temperature sensors, temperature calibration devices, etc. Systems may correct the output drift in these applications by applying a correction signal to the device that generates the signal output. Global temperature correction is an attempt to correct the output signal drift by applying an average correction signal over the entire temperature range. Piecewise temperature correction is an attempt to correct the output signal drift by applying different signal corrections for different temperature ranges.

SUMMARY

[0002] The problems noted above are solved in large part by systems and methods for generating a corrected output signal from a reference utilizing a correction signal. In some embodiments, a temperature dependent correction circuit includes a first supply source, a second supply source, a rectifying circuit, and a reference. The first supply source is configured to supply a first signal that varies with temperature along a first constant or continuously variable slope. The second supply source is configured to supply a second signal that varies with temperature along a second constant or continuously variable slope. The rectifying circuit is configured to receive the first and second signals, rectify the first signal to produce a first rectified signal, and add the first rectified signal to the second signal to produce a correction signal. The reference is configured to receive the correction signal.

[0003] Another illustrative embodiment is a method that may comprise generating a first signal that varies with temperature along a first constant or continuously variable slope. The method may also comprise generating a second signal that varies with temperature along a second constant or continuously variable slope. The method may also comprise rectifying the first signal to produce a first rectified signal. The method may also comprise adding the first rectified signal to the second signal to produce a correction signal. The method may also comprise generating a first reference signal that varies with temperature. The method may also comprise adding the correction signal to the first reference signal to produce an output signal.

[0004] Yet another illustrative embodiment is a reference. The reference may comprise generation logic and adding logic. The generation logic may be configured to generate a first reference signal that varies with temperature. The adding logic may be configured to add the first reference signal to a correction signal received from a rectifying circuit to produce an output signal. The correction signal may comprise a rectified signal added to a first signal. The rectified signal may comprise a first component that varies with temperature along a first constant or continuously variable slope in one or more temperature ranges and a second component that is approximately zero everywhere else. The first current varies with temperature along a second constant or continuously variable slope.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] For a detailed description of various examples, reference will now be made to the accompanying drawings in which:

[0006] FIG. **1** shows a block diagram of a temperature dependent correction circuit in accordance with various embodiments;

[0007] FIG. **2** shows a block diagram of a rectifying circuit in accordance with various embodiments;

[0008] FIG. **3** shows a block diagram of an example supply source and diode in a rectifying circuit in accordance to various embodiments;

[0009] FIG. **4** shows a block diagram of a reference in accordance with various embodiments;

[0010] FIG. **5** shows example current versus temperature graphs for generating a correction signal in accordance with various embodiments;

[0011] FIG. **6** shows an example voltage versus temperature graph for generating an output signal from a reference in accordance with various embodiments; and

[0012] FIG. **7** shows a flow diagram of a method for generating a corrected output signal from a reference in accordance with various embodiments.

NOTATION AND NOMENCLATURE

[0013] Certain terms are used throughout the following description and claims to refer to particular system components. As one skilled in the art will appreciate, companies may refer to a component by different names. This document does not intend to distinguish between components that differ in name but not function. In the following discussion and in the claims, the terms "including" and "comprising" are used in an open-ended fashion, and thus should be interpreted to mean "including, but not limited to . . . ." Also, the term "couple" or "couples" is intended to mean either an indirect or direct connection. Thus, if a first device couples to a second device, that connection may be through a direct connection, or through an indirect connection via other devices and connections. The recitation "based on" is intended to mean "based at least in part on." Therefore, if X is based on Y, X may be based on Y and any number of other factors.

DETAILED DESCRIPTION

[0014] The following discussion is directed to various embodiments of the invention. Although one or more of these embodiments may be preferred, the embodiments disclosed should not be interpreted, or otherwise used, as limiting the scope of the disclosure, including the claims. In addition, one skilled in the art will understand that the following description has broad application, and the discussion of any embodiment is meant only to be exemplary of